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10/073,895	02/14/2002	Naoki Tanaka	020187	6725

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EXAMINER

SUMMONS, BARBARA

ART UNIT	PAPER NUMBER
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2817

DATE MAILED: 05/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/073,895

Applicant(s)

Tanaka et al.

Examiner

Baikun Summora

Group Art Unit

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— The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address —

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 (three) MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- ☐ Responsive to communication(s) filed on \_\_\_\_\_
- ☐ This action is **FINAL**.
- ☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- ☒ Claim(s) 1-21 is/are pending in the application.
- ☐ Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- ☒ Claim(s) 1, 2, 6, 9-12, 16, and 19-21 is/are rejected.
- ☒ Claim(s) 3-5, 7, 8, 13-15, 17, and 18 is/are objected to.
- ☐ Claim(s) \_\_\_\_\_ are subject to restriction or election requirement

## Application Papers

- ☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.
- ☒ The drawing(s) filed on 2/14/02 is/are objected to by the Examiner
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119 (a)-(d)

- ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).
- ☒ All ☐ Some\* ☐ None of the:
- ☒ Certified copies of the priority documents have been received.
- ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
- ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a))

\*Certified copies not received: \_\_\_\_\_

## Attachment(s)

- ☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). \_\_\_\_\_
- ☒ Notice of Reference(s) Cited, PTO-892
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Interview Summary, PTO-413
- ☐ Notice of Informal Patent Application, PTO-152
- ☐ Other \_\_\_\_\_

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## DETAILED ACTION

### *Drawings*

1. Figures 22-25 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated (see the specification from pg. 1, ln. 19 through pg. 3, ln. 23). See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

3. Claims 1, 2, and 6 are rejected under 35 U.S.C. § 102(b) as being anticipated by Kawakatsu et al. U.S. 5,568,002.

Figs. 1A and 1B of Kawakatsu et al. disclose a longitudinal coupled multiple mode (i.e. double mode, see col. 4, lns. 31-33) surface acoustic wave (SAW) filter comprising a plurality of interdigital transducers (IDTs) 44-46 disposed on a piezoelectric substrate 40, and wherein: a

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middle IDT 45 is flanked on each side by side IDTs 44 and 46; a comb electrode 45b of the middle IDT 45 is connected with an input terminal (not numbered), and the other comb electrode 45c of the middle IDT is grounded; a comb electrode 44a and 46a of each of the side IDTs 44 and 46 is connected to an output terminal 48a and 48b (see col. 4, lns. 59-60), and the other comb electrodes of the side IDTs are grounded; and the electrode fingers are so arranged that the adjacent electrode fingers of the middle IDT 45 and the side IDT 46 make a connection between grounds (i.e. the adjacent fingers of IDTs 45 and 46 are connected to grounded comb electrodes 45a and 46b, respectively), and the other adjacent electrode fingers of the middle IDT 45 and the other side IDT 44 make a connection between a terminal and a ground (i.e. the adjacent fingers of IDTs 44 and 45 are connected to the comb electrodes 44a and 45a connected to output terminal 48a and to ground, respectively). Regarding claim 2, the filter includes reflectors 42 and 43 for trapping the surface wave. Regarding claim 6, the output terminals 48a and 48b are facing the same direction.

4. Claims 1, 2, and 6 are rejected under 35 U.S.C. § 102(b) as being anticipated by Strauss et al. U.S. 6,081,172.

Fig. 3 of Strauss et al. similarly to Kawakatsu et al. discloses a longitudinally coupled double mode SAW filter having a plurality of IDTs formed on a piezoelectric substrate (not shown, see col. 2, lns. 43-44), and wherein: a middle IDT3 is flanked on each side by side IDT2 and side IDT 4; the upper comb electrode of the middle IDT3 is connected to an input terminal, and the lower comb electrode of the middle IDT3 is connected to ground; the lower comb

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electrodes of the side IDT2 and the side IDT4 are connected to an output terminal, and the upper comb electrodes of the side IDTs are grounded; and the electrode fingers are so arranged that adjacent electrode fingers of the middle IDT3 and the side IDT2 make a connection between terminals (i.e. the adjacent electrode fingers of IDT2 and IDT3 are connected to an output terminal and the input terminal, respectively), and the other adjacent electrode fingers of the middle IDT3 and the other side IDT4 make a connection between terminal and ground (i.e. the adjacent electrode fingers of IDT3 and IDT4 are connected to the input terminal and ground, respectively). Regarding claims 2 and 6, the filter includes reflectors REF1 and REF5, and the outputs are on the same side of the device.

Additionally, Strauss et al. gives specific reasons for the specific arrangement of the output IDTs 2 and 4 being mirrored with respect to the SAW propagation direction, the reasons being to provide the outputs on the same side, shorter contact paths, and thereby reduce inductive and capacitive influences of the contact paths (see col. 1, lns. 55-65).

5. Claims 1, 2, 6, 9-12, and 16 are rejected under 35 U.S.C. § 102(b) as being anticipated by Hirota et al. JP 10-65481.

Fig. 7 of Hirota et al. discloses a SAW longitudinally coupled double mode filter 12 (see the abstract, lns. 6-7) comprising three IDTs formed on a piezoelectric substrate (not shown, see col. 2, lns. 6-7), and wherein: a middle IDT of filter 12 is flanked on each side by side IDTs; a comb electrode of the middle IDT is connected with an input terminal (i.e. coming from one-port resonator 13), and the other comb electrode of the middle IDT is grounded; a comb electrode

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(i.e. the lower comb in the figure) of each of the side IDTs is connected to an output terminal (i.e. feeding to resonator 14), and the other comb electrodes of the side IDTs are grounded; and the electrode fingers are so arranged that the adjacent electrode fingers of the middle IDT and the side IDT on its left make a connection between grounds (i.e. the adjacent fingers are connected to grounded comb electrodes of the adjacent IDTs being the upper comb of the left-most IDT and the lower comb of the middle IDT, respectively), and the other adjacent electrode fingers of the middle IDT and the other side IDT on its right make a connection between a terminal and a ground (i.e. the adjacent fingers of the middle IDT and the right-most IDT are connected to the upper comb electrodes of each IDT, connected to the input terminal and to ground, respectively).

Regarding claims 9 and 11, the filter includes a one-port resonator 13 that has an antiresonance frequency "approximately equivalent" to the cut-off frequency on the high-pass side of the pass-band of the filter 12 (see the abstract, lns. 1-3 and the last four lines thereof) and the one-port resonator 13 is connected in series with the double mode SAW filter 12.

Regarding claims 2, 10, and 12, the filter 12 includes reflectors for trapping the surface wave, as does the one-port resonator 13.

Regarding claims 6 and 16, the output terminals from the side IDTs are facing the same direction and connected at a node feeding to resonator 14.

6. Claims 19-21 are rejected under 35 U.S.C. § 102(e) as being anticipated by Takamine U.S. 6,556,100.

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Fig. 1 of Takamine discloses a longitudinally coupled multiple mode (see Figs. 8A and 8B) SAW filter 101 comprising a plurality of IDTs 103-105 disposed on a piezoelectric substrate (not shown, see col. 5, lns. 6-8), and wherein: a middle IDT 104 is flanked on each side by side IDTs 103 and 105; a comb electrode of the middle IDT 104 is connected with an input terminal (i.e. coming from resonator 102)[Note that SAW filters are reciprocal devices so either terminal may be the input and the other the output]; a comb electrode of the IDTs 103 and 105 on each side of the middle IDT is connected with an output terminal 119; the width and pitch of adjacent electrode fingers of the input IDT 104 and the output IDTs 103 and 105 (i.e. in areas 103a, 104a, 104b, and 105a, see col. 5, lns. 35-43) are designed to be smaller and narrower, respectively, than the width and pitch of the other electrode fingers (ibid.). Regarding the width of the electrode fingers being smaller, this can be seen in Fig. 1 and is required because the duty of the IDTs is a constant 0.60 (see col. 6, lns. 22-26). Therefore, if the pitch is narrower, the width of the fingers must get smaller to maintain the 0.60 duty ratio. Regarding claim 21, there are a plurality of four electrode fingers in the narrow pitch/small width portions (see col. 5, lns. 53-56 and 65-66).

### *Claim Rejections - 35 USC § 103*

7. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was

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commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 9-12 and 16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kawakatsu et al. U.S. 5,568,002 in view of Hirota et al. JP 10-65481.

Kawakatsu et al. discloses the invention as discussed above (Figs 1A and 1B), except for the double mode SAW filter being connected in series with a one-port resonator with an antiresonant frequency at approximately the upper cut-off frequency of the filter.

It is well known in the art to make such a series connection of a one-port resonator with reflectors to a SAW filter as disclosed, for example, by Hirota et al. (Fig. 7)[see also other prior art of record] in order to steepen the cut-off characteristics of the filter (see Fig. 8) and improve the attenuation at the upper side of the passband of the filter as suggested by Hirota et al. (see the abstract 1-3).

Consequently, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the longitudinally coupled double mode SAW filter of Kawakatsu et al. (Figs. 1A and 1B) by having connected it in series with a one-port resonator with an antiresonant frequency approximately equal to the high-pass side cut-off frequency of the filter, because of the exemplary teaching to do so by Hirota et al. (see Figs. 7 and 8 and the last four lines of the abstract), and because such an obvious modification would have provided the

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advantageous benefits of improved cut-off characteristics and attenuation characteristics as explicitly suggested by Hirota et al. (see the abstract, lines 1-3).

*Allowable Subject Matter*

9. Claims 3-5, 7, 8, 13-15, 17, and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claims 3-5 and 13-15, the prior art of record does not disclose or fairly suggest the combination of (1) the recited arrangement of the middle and side IDT terminals and grounds and (2) the narrower width of the adjacent electrode finger portions. Whereas, Takamine discloses the narrower width and pitch adjacent electrode finger portion, Takamine does not explicitly disclose what benefit is achieved by the structure, so there is no reason to add the narrow finger portions to the art of Kawakatsu et al. or Strauss et al., etc. Similarly, Takamine is not an unbalanced-balanced filter having two balanced outputs (which is not required by the claims as recited), and the outputs of its side IDTs are already on the same side. Therefore, the reasons for mirroring the IDTs given by Strauss et al., i.e. to provide the outputs on the same side, would not apply to a modification of Takamine. Regarding claims 7, 8, 17, and 18, the prior art does not disclose or suggest a SAW filter having the recited arrangement of the IDTs and also having the outputs on opposite sides or all of the grounds on the same side.

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*Conclusion*

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

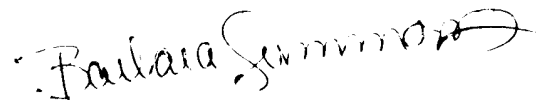
Shimoe U.S. 5,874,868 discloses SAW filters with IDTs meeting the terminal arrangements recited (see Figs. 8A, 8B, 9A, and 9B).

Ushiroku et al. U.S. 5,694,096 (Fig. 6 and col. 5, lns. 50-58) and Ikada et al. JP 7-307641 (Fig. 1 and abstract, lns. 1-10) and Ogawa JP 9-8599 (Fig. 1 and abstract, the last five lines) each disclose that it is well known to connect a one-port resonator in series with a SAW filter with the antiresonant frequency of the resonator on the high pass edge of the SAW filter passband to improve the cut-off and attenuation characteristics at the high pass side of the filter.

Yamanaka JP 10-163792 discloses a SAW double mode filter having the IDT electrodes arranged as recited [see Figs. 5(a)-(c)] with some adjacent electrodes being wider [Fig. 5(c)].

Nakayama JP 10-135780 discloses (Fig. 1) a double mode SAW filter with the IDTs arranged as recited (5b/terminal to 6a/terminal and 6a/terminal to 7a/ground).

12. Any inquiry concerning this communication should be directed to Barbara Summons at telephone number (703) 308-4947, FAX no. (703) 308-7724, receptionist's no. (703) 308-0956, Supervisory Examiner Bob Pascal (703) 308-4909.



Barbara Summons  
Primary Examiner  
Art Unit 2817

bs  
May 2, 2003